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| 10/043,860      | 01/09/2002  | Chi-Wen Liu          | 67,200-624          | 8436             |
| 7590            | 11/03/2004  |                      |                     |                  |
|                 |             |                      | EXAMINER            |                  |
|                 |             |                      | DEO, DUY VU NGUYEN  |                  |
|                 |             |                      | ART UNIT            | PAPER NUMBER     |
|                 |             |                      | 1765                |                  |

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/043,860

Filing Date: January 09, 2002

Appellant(s): LIU ET AL.

*MAILED*  
*NOV 03 2004*  
*GROUP 1700*

Randy W. Tung  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 7/27/04.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is correct.

**(7) *Grouping of Claims***

The rejection of claims 1, 3-6, 9-13, 15-19, 21 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

**(8) *ClaimsAppealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) *Prior Art of Record***

2002/0068451 Torii (Jun 6 2002)

|           |               |         |
|-----------|---------------|---------|
| 6,464,568 | Miller et al. | 10-2002 |
| 5,672,212 | Manos         | 9-1997  |

**(10) *Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

**DETAILED ACTION**

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 5, 6, 10-12, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torii (2002/0068451) and Miller et al. (US 6,464,568).

Torii describes a method for polishing a semiconductor wafer comprising: providing a wafer process surface having a layer of tungsten oxide overlying tungsten; removing the tungsten oxide by dipping the wafer in an alkali (or claimed basic solution) solution (paragraph [0033]); chemically mechanically polishing the wafer by applying abrasive slurry to the wafer process surface (paragraph [0036-0037]). Unlike claimed invention, Torii doesn't describe the step of cleaning the wafer by using a wet cleaning process or cleaning the wafer after polishing (claim 12).

Miller describes a similar method where he teaches of rinsing the wafer surface with DI water (claimed cleaning the wafer with a wet cleaning process) after each process steps including the step of removing the metal oxide and the polishing the wafer (col. 4, line 43-63). It would have been obvious for one skill in the art to modify Torii in light of Miller because rinsing the wafer with DI would clean the wafer of the used solution such as alkali solution so that it doesn't contaminate the next solution such as the slurry in order to polish the wafer with a reasonable expectation of success.

Referring to claim 5, Torii describes the aqueous solution is an alkali solution, which would have a pH greater than 7.0 (please see cited art below). Unlike claimed invention, he doesn't describe the solution has a pH of greater than about 10. However, Miller describes that variation or modification can be made to the solution pH (col. 8, line 45-50) and pre-polish solution pH can be change by changing the concentration of various ingredients in the solution (col. 7, line 15-21). This would suggest that the pH is a result-effective variable that can be changed. Therefore, it would have been obvious to determine the pH of the solution (or etchant) through routine experimentation in order to obtain optimum pH for the removing of the metal oxide with a reasonable expectation of success.

Referring to claim 6, the aqueous alkali solution from Torii that contains KOH would read on claimed KOH and water.

Referring to claims 10 and 11, both Torii (paragraph [0036]) and Miller (col. 6, line 4) teaches the slurry including an oxidizer, H<sub>2</sub>O<sub>2</sub>, which would read on claimed polishing solution forming an oxide layer in-situ over the metal.

Referring to claim 21, it has no patentable weight since the claimed method for removing the oxide can be either wet or dry etching and Torii teaches using a wet etching.

3. Claims 3, 4, 9, 13, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torii and Miller as applied to claim 1 above, and further in view of Manos (US 5,672,212).

Unlike claimed invention, referring to claims 3, 4, 9, 13, 16, applied prior art of Torii and Miller doesn't describe the wet etching and rinsing the wafer while agitating the wafer by using megasonic energy. Manos teaches using megasonic energy for either cleaning or etching a wafer (col. 2, line 5-15). It would have been obvious for one skill in the art in light of Manos to use megasonic energy with cleaning and etching the wafer because Manos teaches that the megasonic radiates energy to increase the reaction rate in the tank (col. 1, line 44-47).

Referring to claim 17, Torii describes the aqueous solution is an alkali solution, which would have a pH greater than 7.0 (please see cited art below). Unlike claimed invention, he doesn't describe the solution has a pH of greater than about 10. However, Miller describes that variation or modification can be made to the solution pH (col. 8, line 45-50) and pre-polish solution pH can be change by changing the concentration of various ingredients in the solution (col. 7, line 15-21). This would suggest that the pH is a result-effective variable that can be changed. Therefore, it would have been obvious to determine the pH of the solution (or etchant) through routine experimentation in order to obtain optimum pH for the removing of the metal oxide with a reasonable expectation of success.

Referring to claim 18, the aqueous alkali solution from Torii that contains KOH would read on claimed KOH and water.

Referring to claim 19, it has no patentable weight since the claimed method for removing the oxide can be either wet or dry etching and Torii teaches using a wet etching.

**(11) Response to Argument**

Referring to Appellants' argument that Torii and Miller do not disclose a dry etching method during fluorocarbons, this limitation is not necessary since the etching can be done by other method such as wet etching as cited in claims 1 an 13.

Referring to Appellants' argument that Torii teaches away from Appellants claimed invention by teaching a two-step polishing process, this is found unpersuasive because the claims describe the method "comprising"; therefore, they do not exclude other steps.

Appellants' argument that Torii and Miller do not describe the pH of the aqueous basic solution is greater than about 10 is acknowledged. However, in the absent of unexpected result, determining the pH through routine experimentation is well known and obvious to one skill in the art, since Miller shows that the pH is a result-effective variable (col. 7, line 15-21; col. 8, line 45-50), in order to provide optimum pH for the etching process.

Referring to Appellants' argument that Miller teaches away from Appellants by using an acid cleaning solution in a pre-polishing cleaning operation for removing copper oxide, this is found unpersuasive since Miller is more likely to teach a way of etching but there is nothing teaching against using another type of solution such as an alkaline solution taught by Torii.

Referring to Appellants' argument that there is reason for combining the teachings of Miller and Torii because they teach removing different types of oxides prior to a polishing process, this is found unpersuasive because Torii teaches using W as an example (paragraph 0027) and he also teaches the metal film to be polish can be W, Al, Cu or the like. It shows that

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the process for polishing W would also can be applied to other metals including Cu, Al or the like with a reasonable expectation of success.

Referring to Appellants' argument that there is no specific motivation to combine the teachings of Manos with Miller or Torii, please see Manos (col. 1, line 44-47), who teaches that the megasonic (claimed agitation) radiates energy to increase the reaction rate in the tank. For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

DVD

November 1, 2004

*lq*

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